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ABSTRACT

This longitudinal study examined the question of change and stability in students' used learning strategies during the first 2 years of study at the university. A total of 188 students from Tilburg University in the Netherlands took part in the study, including 90 in law, 27 in art, 48 in economics, and 23 in the social sciences. The students completed a 100-item inventory at the end of each semester during their first 2 years of study that covered the four domains of learning, namely cognitive processing strategies, metacognitive regulation strategies, learning orientations, and mental models of learning. Significant shifts in learning activity patterns were displayed by students in all four groups. More deep processing strategies and more self-regulation typified the students in the fourth semester compared to the first semester. Students in economics and art showed more shifts in learning strategies than the students in law and the social sciences. Whereas the results of paired-sample t-tests indicated that students showed fluctuations in the learning strategies used and thus were at least partly flexible, there was also evidence for an underlying consistency in learning strategy use. Pearson correlation-coefficients demonstrated strong associations between used learning strategies in the earlier and later semesters. (MDM)

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Change and Stability in Learning Strategies During the First Two Years at the University

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Paper presented at the annual meeting of the American Educational Research Association
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ABSTRACT

In this study we regard the question of change and stability in used learning strategies during the first two years of studying at the university. In order to examine this question we used a longitudinal design, comparing the employed learning strategies for 188 students in (mainly) their first and fourth semester. Except for examining the issue of change and stability as such, we also studied possible explanatory factors. Concurrent changes in related areas (person-bound and context-bound factors) were explored. Significant shifts in learning strategies were displayed. More deep processing strategies and more self-regulation typified the same group of students in a later phase of their studies. The learning environment appeared to become more activating, which fits the results involving shifts in learning strategies. Results in the area of person-bound factors did not reveal clear parallel changes which could explain for the shifts in learning strategies. Whereas the results of Paired-samples T-TESTS indicated that used learning strategies show fluctuations and thus are at least partly flexible, there is also evidence for a consistent part of learning strategies. Pearson correlation-coefficients demonstrated strong associations between used learning strategies in the earlier and later semesters. This indicates a person-bound component in the use of learning strategies. This paradox could be explained by a (mainly) constant staying in-between order of individual differences, while at the same time many individual students adapt to the learning environment in the same direction.

INTRODUCTION

The present paper goes into the question of change and stability in used learning strategies during the first two years students spend at the university. In order to examine this question we used a longitudinal design, comparing the employed learning strategies for four groups of students in (mainly) their first and fourth semester.
Learning strategies are defined as students' learning activity patterns, of which memorizing details and inferring relations are some examples. We were interested in the amount of development that occurs in students' learning activity patterns during their stay at the university. If very stable patterns of learning activity patterns disclose, this would indicate the stable nature of learning strategies. If learning activity patterns would change substantially during the first years at the university this would indicate the flexible nature of learning strategies. The issue relates to the theme of the symposium, namely the question of person- versus context-boundedness of learning strategies.
Except for examining the issue of change and stability in employed learning strategies as such, we also wanted to examine possible explanatory factors. Are there concurrent changes in related areas which can explain for the change or stability in used learning strategies? Referring to the symposium theme there are two areas in which explanatory factors can be sought. These are person-bound factors on the one hand and context-bound factors on the other hand.
Brown, Bransford, Ferrara & Campione (1983) postulate that learning behaviour can be explained by person-bound development as well as by the learning environment. The importance of both person-bound and context-bound factors is also emphasized by e.g. Entwistle & Ramsden (1983) and Vermetten, Vermunt & Lodewijks (1995). In our research we will examine both sources.

Context-bound factors.
Christopoulos, Rohwer & Thomas (1987) found that between secondary education and the college level students are increasingly called upon to integrate information, which can be seen as a 'producing' activity (as opposed to reproducing). They found that also the support and compensation by means of the instructional practice changed with progression in grade level, providing more support directed at 'producing' learning activities. They also showed that such changes in the learning environment evoked parallel changes in the students' learning behaviour patterns.
In our study we wanted to involve similar contextual factors to find out how the learning environment would change during the first two years of a university study and whether this could explain for possible changes in learning strategies. We realized this by measuring particular categories of instructional activity as perceived by the students.

Person-bound factors.
It is expected that students themselves develop during their stay at the university. Their metacognitive knowledge is expected to grow under the influence of increased experience in a university context. Students' motives for studying might also change in the course of time, once they become more familiar with the nature and content of their studies.
Both metacognition and study-motives are important in explaining learning strategies. One aspect of metacognitive knowledge is the student's epistemology; his or her idea about the nature of knowledge. Perry (1970) studied epistemological changes in students at Harvard university. He distinguished several stages in the development of these epistemologies. According to Perry these epistemologies are of significant importance to someone's study approach.
Vermunt (1992), in his research concerning learning styles, used the concept of mental models of learning, referring to the student's view of the nature of learning. He developed an instrument for measuring learning styles and included both mental models of learning and students' motives

for studying in the instrument, next to learning strategies (see also Method). Together he considered them as a 'broad definition of learning styles'. He demonstrated that learning orientations (motives for studying) and mental models of learning explained a significant part of employed learning strategies. Both factors are therefore considered as possible person-bound explanatory factors for change and stability in learning strategies.

To summarize, the goal of our study was to examine change and stability in students' used learning strategies during the first two years of studying at the university. Furthermore we explored possible explanatory factors, considering person-bound variables (mental models of learning and learning orientations) and context-bound variables (perceived categories of instructional activity).

METHOD

Context and participants.
A large scale educational innovation project at Tilburg University (The Netherlands) constituted the context of the present study. In this innovation project several instructional changes were implemented in every university department in successive years. As part of this project an evaluation-study was set up in which year-groups of all departments completed questionnaires. The evaluation-study had a longitudinal (within-subjects) design, comparing the same groups of students on four different moments in time (at the end of each semester during the first two years of study). The present study does not go into the educational innovation, but is only concerned with the longitudinal design.
The data used for the present study were gathered in four different departments: Law, Arts, Economics and Social Sciences. Participants were 188 students, spread over the mentioned departments (90 Law-students; 27 Arts-students; 48 Economics-students; 23 Social Sciences-students).

Materials.
A questionnaire was composed of two different instruments. The first instrument was the Inventory of Learning Styles (ILS) developed by Vermunt (1992). This inventory covered four domains of learning, namely cognitive processing strategies, metacognitive regulation strategies (together constituting the domain of learning strategies), learning orientations and mental models of learning.
The total inventory consisted of 100 items that were based on interview statements of students (Vermunt, 1996). Each item could be answered by means of a five-point Likert scale. In each of the four domains several subscales were constructed, derived from factor-analyses. A description of the subscales is given in Figure 1.

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insert Figure 1

The other instrument measured 'perceived instructional activities' and was developed on behalf of this study. It consisted of 50 items describing instructional activities. Students responded to these items indicating the perceived adequacy of the amount to which the instruction performed these activities (e.g. 'providing guidelines for studying the learning content'). Answers were given by means of a five-point Likert scale, rising from 'this happened much too little' (scored as 1) to 'this happened much too often' (scored as 5). Nine subscales were constructed derived from factor-analyses. The subscales are described in Figure 2.

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insert Figure 2 about here

Procedure.
The questionnaire was sent to the students at the end of the semester. An accompanying letter as well as a postage free return-envelope was sent along with the questionnaire. This procedure was repeated during the first two years after a student first enroled in his/her study. A repeated-measures design with four measurement-moments was thus created.
Participation in the research was voluntary. Response varied from 30 to 55 percent for the different year-groups. The number of students returning all four questionnaires was very low. Therefore we decided to take into account only the first and the last measurement-moment.
In case of the Law-department and Arts-department, the first measurement-moment was after the first semester, and the last measurement-moment was after the fourth semester. In case of the Economics-department the span was shorter (namely after the first respective the third semester) because of changes in their innovation plans (due to which the evaluation study stopped after three semesters). The Social Sciences-students were students attending a post-propaedeutic programme. Therefore in their case the span was even shorter: comparing the third semester to the fourth semester.

Data-analyses.
The repeated-measures design was analyzed by calculating T-TESTS for dependent samples (Paired-samples T-TESTS). This was done for each subscale in the questionnaire. In case of the learning strategy-subscales, Pearson correlation-coefficients were also calculated.

RESULTS

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insert Table 1a and 1b about here

Tables 1a and 1b present the results of the Paired-samples T-TESTS for all departments concerning shifts in employed learning strategies. Considered in its entirety, about half of the distinguished learning strategies appear to show significant shifts under the influence of time spent at the university. It is striking that these shifts concern mainly the more 'academic' learning strategies such as relating and structuring; critically processing; concrete processing; self-regulation. These strategies are used more often in a later phase of an academic study.
The memorizing and analyzing strategy show little significant shifts. Only students of Economics appear to use more analytic strategies in a later phase. External regulation also increases for these students, meaning that they conform themselves more to the external instruction in a later phase of their studies. Other departments don't show this pattern.
Law-students seem to feel 'less in control' in the course of time, witness the fact that their lack of regulation increases. Students of other departments do not reveal this development.
Law-students and students of the Social Sciences show less qualitative changes in their learning strategies as students in both other departments. In the case of Social Sciences this could be explained by the shorter span of time which was considered.

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insert Table 2a and 2b about here

Tables 2a and 2b contain the results of Paired-samples T-TESTS for learning orientations and mental models of learning. Of all T-TEST about one third is significant, which is less than was demonstrated in the case of learning strategies.
For learning orientations a scattered pattern was shown. Law-students become less certificate oriented; students of Economics become more personally interested; Arts-students become more vocationally oriented and students of Social Sciences show a decrease in ambivalence as well as in being personally interested.
Students of Social Sciences and Law appear to change their mental models of learning in the sense that they endorse less the idea of learning as the intake of knowledge. This fits the earlier results concering shifts in learning strategies. However, Law students also endorse less the idea of learning as construction of knowledge. The belief that education should be stimulating decreases for Law-students as well as for Arts-students. Preferences for co-operative learning decrease for Law-students, but increase for students of Economics. Emphasis on use of knowledge does not show shifts over time for any group of students.

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insert Table 3a and 3b about here

Tables 3a and 3b present results concerning alterations over time in perceived instructional activities. About 40% of all T-TESTS showed significant results.
A remark should be made about the interpretation of the mean scores. An increase of a mean score can be interpreted to indicate an increase in instructional activity in the described category (see Method for the meaning of the scores). An alternative meaning however could be a decreased need on the students part for the described instructional activity. For example, whereas in the beginning of their studies students could value a certain amount of e.g. provided exercises as too little, they could value the same amount of provided exercises as adequate in a later phase of their studies. Such a situation would also be expressed by an increase in the mean score.
For three out of four departments (Social Sciences being the exception) the mean scores for 'scholastic' instructional activity increased significantly. From being valued as an instructional activity performed too little, it became to be valued as adequately performed. This probably indicates a lessened need of students for a scholastic learning environment.
The 'explaining', 'motivating', 'concretizing' as well as 'profoundness' category of instructional activities were not perceived differently in the beginning compared to in a later phase of the study.
The amount of questioning increased according to Arts-students, but not according to students of other departments. The amount of perceived freedom surprisingly decreased, argued by Law-students and students of Social Sciences. This result could however indicate a growing need for freedom of students as they stay longer in university, and not an actual decrease of freedom.
The most striking result in Tables 3a and 3b is the agreement off all groups concerning the perceived amount of activating instruction. In the course of time the instruction appears to become more activating, providing students with more assignments, realistic problems, etcetera. Only Arts-students indicated that instructional activity became more supporting, which could connote a decrease in the students' need for this category of instructional activity.

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insert Table 4 about here

Table 4 contains Pearson correlation-coefficients for the learning strategy-subscales, measuring the degree of association between the earlier and later semesters. Almost all coefficients were

statistically significant with an alpha level of .001. Coefficients mainly indicated strong associations between used learning strategies in earlier and later semesters. This confirms a consistent, person-bound component in learning activity patterns.

DISCUSSION AND CONCLUSIONS

In our study we were interested in the change and stability of students' learning activity patterns during their first years at the university.

In all four departments included in our study significant shifts in learning activity patterns were displayed. The shifts gave an optimistic picture of the academic development students go through during their first years at the university. More deep processing strategies (like relating, concrete processing and critically processing), and more self-regulation typified the same group of students in a later phase of their studies.

There appear to be some differences between the four departments. The students of Economics and students of the Arts-department showed more shifts in learning strategies than their colleagues in the Law-department and department of Social Sciences. At this moment it is difficult to give an explanation for this. Nor greater shifts in mental models of learning or learning orientations, nor greater shifts in perceived instructional activities, could explain this difference. Further analyses in which the departments are compared among each other could clear up this issue.

Except for examining the amount of change in employed learning strategies we wanted to examine possible explanatory factors. Concurrent changes in the area of person-bound factors, as well as context-bound factors were explored.

In the area of context-bound factors, perceived instructional activities showed one striking result. In the course of time the learning environment of all departments appeared to become more activating: providing more (group)assignments, realistic problems, group discussions etcetera. This outcome fits the results involving shifts in learning activity patterns and confirms the context-boundedness of learning strategies.

Results in the area of person-bound factors, concerning changes in mental models of learning and learning orientations gave a diverse picture. Only the view of learning as the intake of knowledge which decreased for two groups of students, provided some explanation of the shifts in learning strategies. It could be possible that changes in these domains of learning styles occur more slowly than in the domain of learning strategies. In the present study they provided little explanation for the shifts in learning strategies.

Whereas the results of the Paired-samples T-TESTS indicated that used learning strategies showed fluctuations and thus are at least partly flexible, there is also evidence for a consistent part of learning strategies. Pearson correlation-coefficients demonstrated strong associations between used learning strategies in the earlier and later semesters. This indicates a person-bound component in the use of learning strategies.

In conclusion Paired-samples T-TESTS demonstrated that learning activity patterns were susceptible to changes in the learning environment, indicating their flexibility and context-boundedness. At the same time however Pearson-correlations showed strong agreement between employed learning strategies at different points in time within individual students, indicating their stability and person-boundedness. This paradox could be explained by a (mainly) constant staying in-between order of individual differences, while at the same time many individual students adapted to the learning environment in the same direction. Our study did not yield an answer indicating either a stable nature or a flexible nature of employed learning strategies, but instead yielded evidence for both properties.

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Name	Description	Item example
Cognitive processing strategies		
Relating and structuring	Inferring relations within the subject matter as well as relations with other knowledge, and structuring parts of knowledge into a whole.	I try to discover the similarities and differences between the theories that are dealt with in a course.
Critically processing	Being critical to the opinion of the author, comparing ones vision to that of teachers etcetera.	I draw my own conclusions on the basis of the data that are presented in a course.
Memorizing and rehearsing	Rote learning and learning by heart of facts, definitions etcetera.	I memorize lists of characteristics of a certain phenomenon.
Analyzing	Step-by-step processing of subject matter and having much attention for details.	I analyze the separate components of a theory step by step.
Concrete processing	Seeking examples, try to personalize and relate to ones own experience, and to use knowledge outside the study context.	I try to interpret events in everyday reality with the help of the knowledge I have acquired in a course.
Metacognitive regulation strategies		
Self-regulation	Controlling the learning process yourself, by orientation, planning, monitoring, evaluation etcetera.	When I start reading a new chapter or article, I first think about the best way to study it.
External regulation	Depending on an external source for the regulation of the learning process, e.g., taking learning goals or directions and questions of teachers to heart.	I study according to the instructions given in the study materials or provided by the teacher.
Lack of regulation	Noticing one's difficulties with regulation of the learning process.	I realize that the objectives of the course are too general for me to offer any support.

Figure 1. Description of ILS-subscales; domain of learning strategies.

Name	Description	Item example
Learning orientations		
Certificate oriented	Attach importance to exams, credits and diploma's.	I aim at attaining high levels of study achievements.
Vocationally oriented	Being engaged in preparing for a profession or work.	The main goal I pursue in my studies is to prepare myself for a profession.
Selftest oriented	Being engaged in finding out about ones capability of studying in higher education.	I want to prove to myself that I am capable of doing studies in higher education.
Personally interested	Being interested in the topics, like studying and learning, study for relaxation.	The only aim of my studies is to enrich myself.
Ambivalent	Having doubts about the choice of study, ones capacities, the type of education etcetera.	I doubt whether this is the right subject area for me.
Mental models of learning		
Intake of knowledge	Viewing learning as mainly the teachers responsibility, entailing activities like reproducing facts, answering questions etcetera.	To me, learning is making sure that I can reproduce the facts presented in a course.
Construction of knowledge	Viewing learning as mainly ones own responsibility, entailing activities like relating, devising questions, examples etcetera.	I should look for relationships within the subject matter of my own accord.
Use of knowledge	Emphasizing the importance of the application of knowledge and the usefulness of it.	The things I learn have to be useful for solving practical problems.
Stimulating education	The belief that teachers should encourage and stimulate students in the learning process.	The teacher should encourage me to combine the separate components of a course into a whole.
Co-operative learning	Having a preference for working together with other students.	When I prepare myself for and exam, I prefer to do so together with other students.

Figure 1 continued. Description of ILS-subscales; domain of learning orientations and mental models of learning.

Name	Description
Scholastic	The instruction stimulates root learning, provides repetition, shows faith and praises good work.
Explaining	The instruction explains step by step, distinguishes the main points, gives examples etcetera.
Motivating	The instruction evokes interest, motivates students, provides vivid presentations and demonstrates the importance of the subject.
Concretising	The instruction stresses connections with the student's own experience and with topical events, shows the importance for practice.
Questioning	The instruction stimulates questions to be asked, informs about the understanding of difficult parts, and gives attention to them.
Freedom	The instruction allows freedom in choosing study activities, in study pace, in determining goals.
Profoundness	The instruction provides assignments that make an appeal to deep thinking, asks for making comparisons, stimulates high effort.
Activating	The instruction provides assignments and examples, group-assignments, realistic problems, group discussions etcetera.
Supporting	The instruction provides overviews, introductions, learning-goals and gives directives.

Figure 2. Description of subscales concerning perceived instructional activities.

Table 1a
Paired-samples T-TESTS for Learning Strategies in Four University Departments

Source	df	T[a] RELA	CRIT	MEMO	ANAL	CONC	SELF	EXTE	LACK
Department of Law									
Time	89	-2.77**	-1.24	-1.08	.82	-.37	-.74	1.47	-2.70**
Department of Arts									
Time	26	-4.04***	-3.80**	-.16	-.56	-3.95**	-4.67***	1.32	-1.79
Department of Economics									
Time	46	-4.12***	-4.03**	-1.25	-2.35*	-3.91***	-3.58**	-2.45*	-1.78
Department of Social Sciences									
Time	22	.74	-.97	1.11	.66	-2.48*	-.35	2.95**	1.34

Note. RELA = Relating and structuring; CRIT = Critically processing; MEMO = Memorizing; ANAL = Analyzing; CONC = Concretizing; SELF = Self-regulation; EXTE = External regulation; LACK = Lack of regulation.
*p < .05. **p < .01. ***p < .001.
[a]T-TESTS for paired samples were used.

Table 1b
Means Belonging to Paired-samples T-TESTS for Learning Strategies

Semester	N	Mean RELA	CRIT	MEMO	ANAL	CONC	SELF	EXTE	LACK
Department of Law									
First	90	3.01 (.68)	2.32 (.69)	2.75 (.81)	2.65 (.70)	2.53 (.65)	2.06 (.52)	3.15 (.63)	2.20 (.65)
Fourth	90	3.19 (.70)	2.40 (.71)	2.85 (.94)	2.59 (.72)	2.57 (.71)	2.10 (.56)	3.05 (.68)	2.41 (.73)
Department of Arts									
First	27	3.24 (.70)	2.63 (.81)	2.87 (.89)	2.52 (.54)	2.41 (.85)	2.20 (.70)	3.08 (.60)	1.70 (.47)
Fourth	27	3.70 (.80)	3.09 (.95)	2.90 (1.05)	2.60 (.76)	2.84 (.84)	2.55 (.76)	2.93 (.59)	1.88 (.57)
Department of Economics									
First	47	3.11 (.75)	2.44 (.68)	2.81 (.79)	2.77 (.56)	2.25 (.58)	2.03 (.48)	3.27 (.44)	2.15 (.56)
Third	47	3.46 (.74)	2.77 (.83)	2.93 (.79)	2.97 (.63)	2.57 (.68)	2.23 (.58)	3.46 (.56)	2.28 (.68)
Department of Social Sciences									
Third	23	3.25 (.83)	2.61 (.71)	3.14 (.80)	2.17 (.55)	2.55 (.65)	2.11 (.56)	2.81 (.58)	2.33 (.89)
Fourth	23	3.17 (.62)	2.74 (.92)	2.93 (.84)	2.10 (.75)	2.80 (.64)	2.15 (.59)	2.51 (.73)	2.15 (.90)

Note. Values enclosed in parentheses represent Standard Deviations. RELA = Relating and structuring; CRIT = Critically processing; MEMO = Memorizing; ANAL = Analyzing; CONC = Concretizing; SELF = Self-regulation; EXTE = External regulation; LACK = Lack of regulation.

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Table 2a
Paired-samples T-TESTS for Learning Orientations and Mental Models of Learning in Four University Departments

		T[a]									
Source	df	CERT	VOCA	SELF	PERS	AMBI	INTA	CONS	USE	STIM	COOP
Department of Law											
Time	81	2.63*	-.30	-.82	-1.20	1.61	2.45*	2.99**	1.44	2.64*	3.71***
Department of Arts											
Time	27	-.07	-2.68*	1.03	-1.48	-.10	1.71	-1.28	-.66	3.13**	1.42
Department of Economics											
Time	46	1.00	-.46	-.42	-2.60*	-1.02	.73	1.43	.63	-.36	-2.18*
Department of Social Sciences											
Time	23	.64	-.62	-.79	2.10*	2.48*	2.33*	.42	1.01	1.10	.81

Note. CERT = Certificate oriented; VOCA = Vocationally oriented; SELF = Selftest oriented; PERS = Personally interested; AMBI = Ambivalent; INTA = Intake of knowledge; CONS = Construction of knowledge; USE = Use of knowledge; STIM = Stimulating education COOP= Co-operative learning.
*p < .05. **p < .01. ***p < .001.
[a]T-TESTS for paired samples were used.

Table 2b
Means Belonging to Paired-samples T-TESTS for Learning Orientations and Mental Models of Learning

		Mean									
Sem.[a]	N	CERT	VOCA	SELF	PERS	AMBI	INTA	CONS	USE	STIM	COOP
Department of Law											
First	82	3.67 (.62)	3.77 (.55)	3.09 (.88)	3.17 (.48)	2.00 (.74)	3.53 (.75)	3.45 (.64)	3.99 (.58)	3.17 (.81)	2.77 (.88)
Fourth	82	3.46 (.56)	3.79 (.59)	3.16 (.80)	3.24 (.52)	1.87 (.76)	3.37 (.65)	3.26 (.62)	3.91 (.46)	2.94 (.77)	2.46 (.96)
Department of Arts											
First	28	2.91 (.71)	3.19 (.70)	2.73 (.89)	3.44 (.42)	1.55 (.37)	3.25 (.84)	3.69 (.57)	3.60 (.42)	3.24 (.86)	2.50 (.67)
Fourth	28	2.92 (.68)	3.45 (.61)	2.59 (.79)	3.59 (.59)	1.56 (.52)	3.07 (.85)	3.84 (.47)	3.65 (.56)	2.83 (.83)	2.31 (.94)
Department of Economics											
First	47	3.50 (.66)	3.61 (.59)	3.01 (.91)	3.06 (.54)	1.97 (.62)	3.46 (.62)	3.32 (.63)	3.84 (.52)	3.02 (.88)	2.57 (.77)
Third	47	3.44 (.64)	3.65 (.65)	3.05 (1.02)	3.22 (.53)	2.06 (.67)	3.40 (.71)	3.20 (.66)	3.79 (.57)	3.06 (.86)	2.80 (.79)
Department of Social Sciences											
Third	24	3.05 (.67)	3.53 (.62)	2.83 (.89)	3.25 (.45)	2.09 (.60)	3.51 (.70)	3.39 (.42)	4.02 (.54)	3.19 (.77)	2.77 (.93)
Fourth	24	2.99 (.60)	3.59 (.49)	2.95 (.80)	3.06 (.49)	1.94 (.58)	3.35 (.63)	3.34 (.65)	3.93 (.53)	3.07 (.74)	2.65 (.95)

Note. Values enclosed in parentheses represent Standard Deviations. CERT = Certificate oriented; VOCA = Vocationally oriented; SELF = Selftest oriented; PERS = Personally interested; AMBI = Ambivalent; INTA = Intake of knowledge; CONS = Construction of knowledge; USE = Use of knowledge; STIM = Stimulating education COOP= Co-operative learning.
[a]Sem. = Semester.

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Table 3a
Paired-samples T-TESTS for Perceived Instructional Activities in Four University Departments

Source	df	T[a] SCHO	EXPL	MOTI	CONC	QUES	FREE	PROF	ACTI	SUPP
Department of Law										
Time	82	-2.05*	.68	.93	-1.19	-.46	2.29*	-.93	-4.01***	-.83
Department of Arts										
Time	24	-2.09*	-1.66	-.60	-1.67	-2.08*	.76	-.89	-4.63***	-2.19*
Department of Economics										
Time	45	-2.81**	-.43	1.43	-1.44	.49	-1.29	-1.44	-2.57*	-.57
Department of Social Sciences										
Time	22	-1.58	-1.37	-.34	-1.07	1.44	2.10*	-1.80	-3.44**	-.35

Note. SCHO = Scholastic; EXPL = Explaining; MOTI = Motivating; CONC = Concretizing; QUES = Questioning; FREE= Freedom; PROF = Profoundness; ACTI = Activating; SUPP = Supporting.
*p < .05. **p < .01. ***p < .001.
[a]T-TESTS for paired samples were used.

Table 3b
Means Belonging to Paired-samples T-TESTS for Perceived Instructional Activities

Sem.[a]	N	Mean SCHO	EXPL	MOTI	CONC	QUES	FREE	PROF	ACTI	SUPP
Department of Law										
First	83	2.39 (.39)	2.64 (.32)	2.51 (.45)	2.30 (.34)	2.56 (.38)	2.61 (.39)	2.50 (.40)	2.29 (.40)	2.57 (.38)
Fourth	83	2.48 (.39)	2.61 (.32)	2.46 (.48)	2.35 (.42)	2.58 (.39)	2.49 (.41)	2.54 (.40)	2.46 (.41)	2.61 (.40)
Department of Arts										
First	25	2.60 (.31)	2.71 (.22)	2.44 (.42)	2.31 (.25)	2.62 (.32)	2.53 (.36)	2.63 (.39)	2.30 (.35)	2.78 (.23)
Fourth	25	2.72 (.29)	2.81 (.25)	2.52 (.56)	2.44 (.39)	2.77 (.33)	2.46 (.40)	2.72 (.35)	2.59 (.32)	2.88 (.25)
Department of Economics										
First	46	2.42 (.40)	2.64 (.29)	2.43 (.39)	2.32 (.35)	2.51 (.41)	2.63 (.45)	2.46 (.35)	2.23 (.44)	2.65 (.29)
Third	46	2.57 (.35)	2.67 (.33)	2.31 (.52)	2.42 (.41)	2.47 (.46)	2.73 (.47)	2.56 (.44)	2.39 (.44)	2.69 (.42)
Department of Social Sciences										
Third	23	2.60 (.30)	2.54 (.40)	2.23 (.52)	2.22 (.30)	2.73 (.41)	2.49 (.39)	2.48 (.34)	2.47 (.53)	2.54 (.42)
Fourth	23	2.67 (.36)	2.62 (.35)	2.26 (.45)	2.30 (.31)	2.59 (.35)	2.32 (.46)	2.60 (.30)	2.73 (.46)	2.58 (.40)

Note. Values enclosed in parentheses represent Standard Deviations. SCHO = Scholastic; EXPL = Explaining; MOTI = Motivating; CONC = Concretizing; QUES = Questioning; FREE= Freedom; PROF = Profoundness; ACTI = Activating; SUPP = Supporting.
[a]Sem. = Semester.

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Table 4
Pearson Correlation-coefficients for Learning Strategies in Four University Departments

RELA	CRIT	MEMO	ANAL	CONC	SELF	EXTE	LACK
Department of Law Correlations between first and fourth semester							
.57***	.61***	.55***	.53***	.34***	.62***	.51***	.47***
Department of Arts Correlations between first and fourth semester							
.70***	.74***	.63***	.30	.76***	.86***	.51**	.51**
Department of Economics Correlations between first and third semester							
.68***	.74***	.62***	.49***	.61***	.75***	.42**	.70***
Department of Social Sciences Correlations between third and fourth semester							
.79***	.71***	.40*	.66***	.71***	.69***	.74***	.73***

Note. RELA = Relating and structuring; CRIT = Critically processing; MEMO = Memorizing; ANAL = Analyzing; CONC = Concretizing; SELF = Self-regulation; EXTE = External regulation; LACK = Lack of regulation.
*p < .05. **p < .01. ***p < .001.

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